

# SEQUENCE LISTING

SEQ 1: *Arabidopsis thaliana* GAD1

1 atggtgctct cccacgccgt atcggagtcg gacgtctccg tccactccac attcgcatca  
61 cgttacgtcc gtacttcact tcctaggttc aagatgccgg aaaactcgat tcctaaggaa  
121 gcggcgatc agatcatcaa cgacgagtcg atgcttgacg ggaatccacg gttgaactta  
181 gcctcctttg tgacgacatg gatggagcct gagtgtgata aactcatcat gtcctccatc  
241 aacaagaact atgttgacat ggacgagtac cccgtcacca ccgaacttca gaaccgatgt  
301 gtgaacatga ttgcacatct attcaatgca ccgttagaag aggcggagac cgccgtcgga  
361 gtaggaaccg ttggatcatc ggaggccata atgttggccg gtttggcctt caagcgtaaa  
421 tggcagaaca agcgcaaagc tgaaggcaaa cccgtcgata aaccaacat tgtcaccgga  
481 gccaatgttc aagtgtgttg ggagaaattc gctaggtact ttgaggttga acttaaggaa  
541 gtgaaattga gtgaaggata ctatgtgatg gacctcaac aagctgttga tatggttgat  
601 gagaacacca tttgtgttgc ggacattcct ggttccactc ttaatggaga attcgaagat  
661 gttaaactct tgaacgatct cttggtcgaa aagaacaaag aaaccggatg ggatacacca  
721 atccacgtgg atgcggaag tggaggattc attgcaccgt ttttgtatcc ggaattggaa  
781 tgggacttta gacttccctt ggtgaagagt atcaatgtga gtggtcaca gtatggactt  
841 gtgtacgcag ggttgggttg ggtgatctgg agaaacaaag aggatttgcc tgaggaactc  
901 atcttccata tcaattatct tgggtctgac caaccacct ttactctcaa tttctccaaa  
961 ggttcaagtc aagtgtgttc tcaatactac caacttatcc gattgggcca cgaggggttac  
1021 agaaatgtga tgggaattg cagagagaat atgatcgcc taagggaagg acttgagaag  
1081 acagaaaggt tcaacatcgt ctcaaaggac gaggaggtgc cacttgcgc tttctccttg  
1141 aaagatagca gctgtcacac tgagttcgaa atctccgaca tgcttcgcag gtatggatgg  
1201 atagtgccgg cctacacaat gcctccaaat gcacaacaca tcaactgttct tcgtgtggtt  
1261 atcagagaag atttctcgag aacactcgct gagagacttg tgatcgatat agagaaagtg  
1321 atgctgtgagc tcgatgagct tccttcgaga gtgattcaca aaatatcact tggacaagag  
1381 aagagtgaat ctaacagcga taacttgatg gtcacggtga agaagagcga tatcgacaag  
1441 cagagagata tcatcactgg ctggaagaag tttgtcgccg acaggaagaa gacgagtggt  
1501 atctgctaa

SEQ2: *Arabidopsis thaliana* GAD1

MVLSHAVSESDVSVHSTFASRYVRTSLPRFKMPENSIPKEAAYQIINDELMLDGNPRNLNLASFVTTWME  
PECDKLIMSSINKNYVDMDEYPTTELQNRVNMIAHLFNAPLEEAETAVGVGTGVSSEAIMLAGLAFK  
RKWQNKRAEGKPVDPKNIVTGANVQVCWEKFARYFEVELKEVKLSEGYVMDPQQAVDMVDENTICVA  
DILGSTLNGEFEDVKLLNDLLVEKNKETGWDTPHVDAAAGGFIAPFLYPELEWDFRLPLVKSINVS  
GH KYGLVYAGIGWVIWRNKEDLPEELIFHINYLGADQPTFTLNFSKGSSQVIAQYYQLIRLGHEGYRNVME  
NCRENMIVLREGLEKTERFNIVSKDEGVPLVAFSLKDSSCHTEFEISDMLRRYGWIVPAYTMPNAQHI  
TVLRVVIREFSRTLAERLVIDIEKVMREDELPSRVIHKISLGQEKSESNSDNLMTVKKSDIDKQD  
IITGWKKFVADRKKTSKIC

SEQ 3: *Arabidopsis thaliana* GAD2

1 ctaaacagaa acaaagatgg ttttgacaaa aaccgcaacg aatgatgaat ctgtctgcac  
61 catgttcgga tctcgctatg ttccgactac acttcccaag tatgagattg gtgagaattc  
121 gataccgaaa gacgctgcat atcagatcat aaaagatgag ctgatgcttg atggtaaccc  
181 gaggcttaac ctacttctgt ttgtgactac atggatggaa ccagagtgtg acaaactcat  
241 catggactct atcaacaaga actacgttga tatggatgag taccctgtca caactgagct  
301 ccagaaccga tgtgtaaaca ttatagctcg actgttcaat gcgccactcg aggaatctga  
361 gacggcgggtg ggagtaggga cagttggttc ttcagaagcc atcatgttag ccggattggc  
421 cttcaaaaaga aaatggcaga acaaacgcaa ggctgagggg aaaccctatg acaaacccaa  
481 cattgtcact ggagccaatg ttcaagtttg ctgggagaaa ttcgctcggt acttcgaggt  
541 ggagctaaaag gaagtaaacc taagtgaagg ttactacgtg atggatccag acaaagcagc  
601 agaaatggta gacgagaaca caatctgtgt cgcagccata ttgggatcca cactcaacgg  
661 tgagttcgaa gacgtgaaac gtctcaatga cttgctagtc aagaaaaacg aggagactgg  
721 ttggaacaca ccgatccacg tggatgcaga aagtggaggg ttcatagtc cgtttatcta  
781 tcctgaatta gaatgggact tttagacttcc tttgggttaag agtatcaacg tgagtgggtca

841 caagtatgga ctgggtctatg ctgggtattgg ttgggtcgtg tggagggcag cagaggattt  
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 961 caatttctcc aagggatcga gccaaattat tgctcaatac taccagctca ttcgtcttgg  
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 1321 tatttcgaag gtgcttcatg agctagatac cttgccttcc aagatatcta agaagatggg  
 1381 aatagaaggg atcgcggaag atgtaaagga gaagaagatg gagaaggaga ttctgatgga  
 1441 agttattgtt ggatggagga agtttgtgaa ggagaggaag aagatgaatg gtgtgtgcta  
 1501 agcaagtgtg ttgcctttgt gtggaaatga agaggtactt gcgaggactt tgcgtttatc  
 1561 agtttatgtg tttgtatata tatttgatcc agttattatg gattatatac gcttgaaact  
 1621 cattttaagc cattgttatt gaacgtttat caaatacttt attat

SEQ 4: *Arabidopsis thaliana* GAD2

MVLTKTATNDESVCTMFGSRYVRTTLPKYEIGENSIPKDAAYQIIKDELMLDGNPRLNLASFVTTWMEP  
 ECDKLIMDSINKNYVDMDEYPTTELQNRVNIIARLFNAPLEESETA VGVGT VGSSEAIMLAGLAFKR  
 KWQNKRAEGKPYDKPNIVTGANVQVCWEKFARYFEVELKEVNLSEGYVMDPKAAEMVDENTICVAA  
 ILGSTLNGEFEDVKRLNDLLVKKNEETGWNTPIHVDAASGGFIAPFIYPELEWDFRLPLVKSINVSCHK  
 YGLVYAGIGVWVWRAEDLPEELIFHINYLGAQDPTFLNFSKGSSQIIAQYYQLIRLGFEGYKNVMEN  
 CIENMVVLKEGIEKTERFNIVSKDQGVVAVSLKDHFSHFNEFEISEMLRRFGWIVPAYTMPADAQHIT  
 VLRVVIREFSRTLAEERLVADISKVLHELDTLPSKISKMGIEGIAENVKEKKMEKEILMEVIVGWRKF  
 VKERKKMNGVC

SEQ 5: *Arabidopsis thaliana* GAD3

ATGGT'TTTATCTAAGACAGCTTCCAAATCCGATGATTCAATCCATTCAACTTTTGCTTCCCGTTATGTC  
 CGCAACTCTATCTCACGGTAAGAAGTTGAAACACAAATTTATTTTGT'TTAATGTTTTCATTGGTAACCTA  
 GAGTTC'TAAAAC'TTAGCCTAGACGACGATACACAGCATCTTGATTCTAGATTC'AATATTTATACAGAA  
 ATATTTATTTT'TAATATACGATATAGTTCCAGATTTTAAATTTTGGGTACATAAGAAAGAATACTAGAT  
 TCTAACGAAATTAACCACTTGCAC'TGAAAGATCCGAGCATAATGTGTGTTACTATATAAGAGGTATTTT  
 CTTTTTTAATCTTAAGCTAAATATATCAATTTTTCATCAGATTTCGAAATACCTAAGAACTCGATCCCTA  
 AGGAAGCAGCATACCAAATCATCAACGACGAGCTCAAGTTTGACGGTAACCCGAGGCTAAACCTGGCCT  
 CCTTTGTGACCCTTGGATGGAGCCAGAATGTGACAAGCTCATGATGGAATCCATCAACAAGAACAAACG  
 TTGAGATGGACCAATACCCGTGT'TACCACCGACCTTCAGAATCGATGCGTTAATCATGATGCGCGTCTCT  
 TCAACGCGCCTTTAGGTGACGGTGAAGCCGGCATTTGGTGT'TGGCACGGTGGGGTCATCGGAGGCAGTGA  
 TGT'TGGCCGAGCTGGCCTTTAAGAGACAGTGGCAGAACAAAGCGTAAGGCCCTAGGGCTGCCTTATGATA  
 GACCTAATAT'TGTAACCGGAGCCAATATTCAGGTAAACCAAAACAAAATTTGATTAAATTTTAAACCGG  
 TTTAGGCTCTATGTTTACATTGACTCAATTTCCGGTTCAATACAGGTTTGCTTGGAGAAATTTGCAAGGT  
 ATTTTGAAGTGGAGCTTAAGGAAGTGAAGCTGAGAGAAGGATATTACGTGATGGACCTGACAAAGCGG  
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 AAGACGTTAAGCTCCTCAACGACCTTTTAGTCGAGAAAAACAAGAAAAACCGGTAAT'TGAATCAAAACC  
 AACTAACAAATTAATTTTATATAC'TTTTGCTTAGAAATATTACAATTTCTAACGTGAGATATATTGCT  
 TAGAAATATTTTATTTT'TGAATGAATATAAACTTATTAACCAAAACAAAACCATATATGTTTACATT  
 ATATGCTTCCTTGTATCGAATGGTGT'TTAAATACTGATTAAAAAATGTTTGTCTTAAAAATATAACAA  
 TTTATAATGTGAGATAT'TCAAGCATCTAATATCAAACCGATAAAACAACAACAACTGATTATTAATTT  
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 GTGGTGGGTTTATTTGCTCCCTTCTTTGTATCCGGACTTGGAGTGGGATTTCCGGTTACCGTTGGTTAAGA  
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 TCGAGGTAAATAAATACTCAATAAAGAACTAAAAACGTTACTAAATCCAATCGTATACGTACTAGTATA  
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AGCCGCCACAACGAGTTTCGAGGTGGCCGAAATGCTTCGTCGCTTCGGCTGGATCGTTCCGGCCTACACG  
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GCTGAGAGATTGGTAGCCGATTTCGAGAAGGTTCTACACGAGCTCGATACGTTCCCGCGAGGGTTCAC  
GCCAAGATGGCTAGTGGAAAAGTTAACGGTGTTAAGAAGACGCCAGAGGAGACGCAAAGAGAAGTCACG  
GCCTACTGGAAGAAGTTTGTGGACACTAAGACTGACAAGAACGGCGTTCCGTTAGTAGCAAGTATTACC  
AATCAATGA

SEQ 6: *Arabidopsis thaliana* GAD3

MVLSKTSKSDSIHSTFASRYVRNSISRFEIPKNSIPKEAAYQIINDELKFDGNPRLNLASFVTTWME  
PECDKLMMESINKNNVEMDQYPVTTDLQNRNVNMIARLFNAPLGDGEAAIGVGTGVSSEAVMLAGLAFK  
RQWQNKRKALGLPYDRPNIVTGANIQCLEKFARYFEVELKEVKLREGYYVMDPKAVEMVDENTICVV  
AILGSTLTGEFEDVKLLNDLLVEKNKKTGWDTPIHVDAASGGFIAPFLYPDLEWDFRLPLVKSINVSGH  
KYGLVYAGIGWVWVRTKTDLPELIFHINYLGADQPTFTLNFSGSSQVIAQYYQLIRLGFEGYRNVMD  
NCRENMMVLRQGLEKTGRFNIVSKENGVPVAFSLKDDSRHNEFEVAEMLRRFGWIIVPAYTMPADAQHV  
TVLRVVIREDFSRTLAERLVADFELVHELDLTPARVHAKMASGKVNGVKKTPREETQREVTAIWKKFVD  
TKTDKNGVPLVASITNQ

SEQ 7: *Arabidopsis thaliana* GAD4

ATGGTTTTGTCTAAGACAGTTTCCGAATCTGATGTCTCAATCCATTCAACTTTTGCTTCTCGTTACGTC  
CGCAACTCTCTTCCACGGTAACAACTTGTAACACAAATCTTTTGCTAATGTTTTTCGTCACAACATAGTA  
ACATGTAATGATGTAAACCTTGGATAGTTTTTTTTTTTGGCCGTGGTTAATGTTGTAGATTTATTATGTG  
TTATATACATATAAGGAAGGACATGTTTCGTTATTTTAACTTAATGTATCATCATTTTCATCATTAGATT  
GAAATGCCGTGAGAACTCAATCCCAAGAGCAGCTTACCAAATCATCAACGACGAGCTAATGCTCGAT  
GGTAACCCAAGGCTGAACCTAGCTTCCTTTCGTGACCACATGGATGGAGCCAGAAATGTGACAAGCTCATG  
ATGGAGTCCATCAACAAGAACTACGTCGACATGGACGAGTACCCTGTCACCACTGAGCTTCAGAACC  
TGTTGTTAACATGATAGCACGTCCTTCAACGCGCCGCTTGGTGACGGTGAAGCTGCCGTTGGTGTTGGC  
ACCGTCGGATCGTCGGAGGCGATTATGTTGGCCGGTTTGGCTTTTAAGAGACAAATGGCAGAAATAAGCGT  
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AAAAATTGATGAAATATTAACCAAGACAAAATGAAATTTATCAATCCGGTTAAGTTATATGTGTGACTC  
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GAACCTAAGAGAAGACTATTACGTGATGGACCCGTGTAAGGCGGTGCAAAATGGTAGACGAAAAACACAAT  
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GTTAAGAGTATTAATGTGAGTGGTCACAAATACGGTTTTGGTTTACGCCGGTATTGGTTGGGTTGTATGG  
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TACCAAATGGTCAATAAAGAACTAGAAATGTATTATATTTAAGTTGTTACTTGTACTATACTTTGAAT  
TAAACGTTCCCTAACATGACTAGTTTTTGGTATTGTGTAATTAATAATGTTTTCTTGTGTTGATTTAGGGT  
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CGTTTTTAAATCGTCTCCAAAGAAAACGGTGTTCGGTTAGTGGCGTTTTCTCTCAAAGATAGTAGCCGC  
CACAACGAGTTTCGAGGTGGCCATACACTCCGTCGCTTCGGCTGGATCGTTCCGGCCTACACGATGCCT  
GCGGATGCGCAGCATGTCACGTCTCTTCGAGTTGTTATCCGAGAAGATTTCTCTCGAACCTTAGCCGAG  
AGATTGGTAGCTGATTTTCGAGAAGGTTCTACACGAGCTCGATACGTTCCGGCGAGGGTTACGCCAAG  
ATGGCTAATGGAAGGTTAACGGTGTTAAGAAGACGCCAGAGGAGACGCAGAGAGAAGTCACGGCTAC  
TGGAAGAAGTTGTTGGAGACTAAGAAGACCAACAAGAACAATTTGCTAA

SEQ 8: *Arabidopsis thaliana* GAD4

MVLSKTVSESDVSIHSTFASRYVRNSLPRFEMPENSIPKEAAYQIINDELMLDGNPRLNLASFVTTWME  
PECDKLMMESINKNYVDMDEYPVTTTELQNRNVNMIARLFNAPLGDGEAAVGVGTGVSSEAIMLAGLAFK  
RQWQNKRAQGLPYDKPNIVTGANVQVCWEKFARYFEVELKEVNLREDYYVMDPVKAVEMVDENTICVA  
AILGSTLTGEFEDVKLLNDLLVEKNKQGTGWDTPIHVDAASGGFIAPFLYPELEWDFRLPLVKSINVSGH  
KYGLVYAGIGWVWVRTKTDLPELIFHINYLGADQPTFTLNFSGSSQVIAQYYQLIRLGFEGYRNVMD

NCRENMMVL RQGLEKTGRFKIVSKENG VPLVAFSLKDSSRHNEFEVAHTLRRFGWIVPAYTMPADAQHV  
TVLRVVIRED FSR TLAERLVADFEKVLHELD TLPARVHAKMANGKVNGVKKTPEETQREV TAYWKLLLE  
TKKTNKNTIC

SEQ 9: *Arabidopsis thaliana* GAD5

ATGGTACTCGCAACCAACTCTGACTCCGACGAGCATTTGCATTCCACTTTTGCTTCTAGATATGTCCGT  
GCTGTTGTTCCAGGTTCCAGAGAGTTTGGCTCATTTTAGTTTTTTAATCTTGATGCTACATTGTT  
ATATATTTAATTATTTATGTATCTGTTTGCATATATTGAAACAGGTTCAAGATGCCTGACCATTGCATG  
CCCAAAGATGCTGCTTATCAAGTGATCAATGATGAGTTGATGCTTGATGGTAATCCAGGCTTAACCTA  
GCCTCCTTTGTCAACCACTTGGATGGAACCTGAGTGTGACAACTCATCATGGATTCTGTCAATAAGAAC  
TATGTTGATATGGATGAATATCCTGTCACCACTGAGCTCCAGGTTCCCTCCTTCTTTCCTCTCATTCTCT  
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CTCAAAGAGGTGAAACTAAGTGAAGACTACTATGTTATGGATCCAGCTAAAGCTGTAGAGATGGTGGAT  
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TAAGAGAAGGAATAGAGATGACAGGGAAGTTCAACATTGTGTCCAAAGATATTGGCGTGCCACTAGTGG  
CATTCTCTCTCAAAGACAGTAGCAAGCACACGGTGTGTTGAGATCGCAGAGTCTTTGAGAAAATTCGGGT  
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AAGACTTTAGCCGAGGCCTTGAGATAGACTCATCACATATCATTTCAGGTGCTGAAAGAGATTGAAG  
GGCTTCTTAGCAGGATTGCACATCTTGCTGCGGCTGCAGCGGTTAGTGGTGATGATGAAGAAGTTAAAG  
TGAAGACTGCCAAGATGTCCTTGGAGGATATCACTAAGTATTGGAAACGCCTTGTGGAACACAAGAGAA  
ATATTGTCTGCTAA

SEQ 10: *Arabidopsis thaliana* GAD5

MVLATNSDSDEHLHSTFASRYVRAVVRPFKMPDHCMKPDAAAYQVINDELMLDGNPRNLNASFVTTWMEP  
ECDKLIMDSVNKNYVDMDEYPTVTELQNRVNMIANLFHAPVGEDEAAIGCGTVGSSEAIMLAGLAFKR  
KWQHRRKAQGLPIDKPNIVTGANVQVCWEKFARYFEVELKEVKLSYDYVMDPAKAVEMVDENTICVAA  
ILGSTLTGEFEDVKQLNDLLAEKNAETGWETPIHVDAASGGFIAPFLYPDLEWDFRLPWVKSINVS HK  
YGLVYAGVGVWVVRKDDLPEELVFHINYLGAQPTFTLNFSGKSSQIIAQYYQFIRLGFEGYKNIMEN  
CMDNARRLREGIEMTGKFNIVSKDIGVPLVAFSLKDSSKHTVFEIAESLRKFGWIIIPAYTMPADAQHIA  
VLRVVIRED FSRGLADRLITHIIQVLKEIEGLPSRIAHAAAAVSGDDEEVKVKTAKMSLEDITKYWK  
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SEQ 11: Tobacco *NtGAD1*

1	aaaatatctc	catttttctcc	cttgttttag	tctctgatct	tctccgtcgt	actaccacca
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121	tttcgcttcc	cgatatgttc	gtacttctct	tccgaggttt	aagatgccag	agaattcgat
181	accaaaggaa	gcagcatatc	aaatcataaa	tgatgagctt	atgttagatg	gaaatccaag
241	actaaattta	gcatcttttg	tgacaacatg	gatggaacca	gagtgttaaca	aactgatgat
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421	tgcagttgga	gttggaactg	ttggatcctc	tgaggctatt	atgcttgctg	gattagcttt
481	caagagaaaa	tggcaaaata	aaatgaaagc	ccaaggcaag	ccctgtgaca	agcccaatat
541	tgctactggt	gccaatgtcc	aggtgtgttg	ggagaaattt	gcaaggattt	ttgaagtgga
601	gctaaaggaa	gtaaagttga	gtgatggata	ctatgtgatg	gaccctgaga	aagctgtgga
661	aatggtggat	gagaacacaa	tttgtgtagc	tgctatcttg	ggttccacac	tcaatggtga

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721 atttgaagat gttaagcgct tgaatgacct cttgattgag aagaacaaaag aaaccgggtg
781 ggacactcca attcatgtgg atgcagcaag tgggtggattt attgcaccat tcctttatcc
841 agagcttgaa tgggacttta gattgccatt ggtgaagagt ataaacgtga gtggtcacaa
901 atatggtctt gtttatgctg gtattggttg ggccatttgg aggaataagg aagacttacc
961 tgacgaactt atcttccaca ttaattatct tgggtgctgat caacctactt tcactctcaa
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1081 tgaggggttac aagaatgtta tggagaattg tcaagaaaat gcaaggggtac taagagaagg
1141 acttgaaaaa agtggaagat tcaacataat atccaaagaa attggagttc cattagtagc
1201 tttctctctt aaagacaaca gtcaacacaa tgagttcgaa atttctgaaa ctcttagaag
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1501 tactactgca tggagaagaat ttgttgctga taagaagaag aagactaacg gagtttgta
1561 atttaattta acaaaatatg tttataatta atatgatgat ttataactac tagcagtggt
1621 actgcttggt tttatatttg aattgttggg ttttttgagt atgaggagct agctatttat
1681 tgctagttaa atattgggtg aaaaa

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SEQ 12: Tobacco NtGAD1

MVLSKTASESDVSIHSTFASRYVRTSLPRFKMPENSIPEKAAAYQIINDELMLDGNPRNLNASFVTTWME  
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 RKWQNKMKAQGKPCDKPNIVTGANVQVCWEKFARYFEVELKEVKLSDDGYVMDPEKAVEMVDENTICVA  
 AILGSTLNGEFEDVKRLNDLLIEKNKETGWDTPIHVDAASGGFIAPFLYPELEWDFRLPLVKSINVS  
 KYGLVYAGIGWAIWRNKEDLPDELIFHINYLGADQPTFTLNFSGSSQVIAQYYQLIRLGFEGYKNVME  
 NCQENARVLRGLEKSGRFNIIISKEIGVPLVAFSLKDNSQHNEFEISETLRRFGWIIPAYTMPNPNAQH  
 TVLRVVIREDFSRTLAEERLVIDIEKVLHELDTLPARVNAKLAVAEANGSGVHKKTREVDQLEITTAWK  
 FVADKKKKTNGVC

SEQ 13: Tobacco NtGAD2

```

1 tatttttcatt ttctctcctg ttttaatttc tgatcttctc cgtcgtacta ccaccactac
61 gccgccatgg ttctgtccaa gacagcgctg gaaagtgcag tctccgttca ctccactttc
121 gccctccgat atgttcgaac ttctcttccc aggttttaaaa tgccagagaa ttcaatacca
181 aaggaagcag catatcagat tataaatgat gagcttatgt tagatggaaa tccaaggcta
241 aatttagcat ctttcgttac aacatggatg gagccagaat gtaatacgtt aatgatggat
301 tccattaaca agaactacgt tgacatggat gaataccctg taaccactga gcttcagaat
361 cgatgtgtaa atatgatagc tcatttggtt aatgcaccac ttggagatgg agagactgca
421 gttggagttg gaactgttgg atcctctgaa gctattatgc ttgctggatt agcctttaag
481 agaaaatggc aaaataaaat gaaagcccaa ggcaagccct ttgataagcc caatattgtc
541 accggtgcta atgtccaggt gtgttgggag aaatttgcaa ggtattttga agtggagttg
601 aaagaagtaa aattgagtga tggatactat gtgatggacc ctgagaaatg tgtggaaatg
661 ttggatgaga ataccatttg tgttgctgct atcttaggtt caaactcaa tgggtgaattt
721 gaagatgtta agcgtttgaa tgaccttttg attgagaaga acaaagaaac cgggtgggac
781 actccaattc atgtggatgc agcaagtggg ggattttattg caccattcct ttatccagag
841 cttgaatggg acttttagatt gccattggag aagagtatta atgtgagtgg tcacaaatat
901 ggtcttctct atgctggtat tggttgggcc atttgaggga ataaggaaga cttgcctgat
961 gaacttattt tccacatcaa ttaccttggg gctgatcaac ctactttcac tctcaacttc
1021 tctaaagggt ctagccaagt aattgctcaa tattaccaac ttattcgctt gggttttgag
1081 ggttacaaga atgttatgga gaattgtcaa gaaaatgcaa ggtattaag agaaggaatt
1141 gaaaaaagtg gaagattcaa cataatctcc aaagaaattg gagttccctt agtagcattt
1201 tctcttaaag acaacagtca acacaatgag ttcgaaattt ctgaaactct tagaagattt
1261 ggatggattg ttctggcata tactatgcca ccaaatgctc aacatgtcac agttctcaga
1321 gttgtcatta gagaagattt ctccgcaca ctacggagc gactggtaat agacattgaa
1381 aaagtcttcc acggagtaga cacacttccg gcgaggggtc acgctaagct agccgtggcc
1441 gaggcgaatg gcagcgcggt gcataagaaa acagatagag aagtgcagct agagattact
1501 actgcatggg tgaatttggg tgctgataag aagaagaaga ctaatggagt ttgttaattt
1561 aatttaacaa aaaaaaagt tataatatgg tgatttatgt aactactagc agtcgtactg
1621 cttgtttttt atatttgagt tgatgtgttt tttgagcact tgaggagcta gctagtattt
1681 gctagtgaat aattggatga tataatttgg actactttgt aagtttgat tattaatcca
1741 aattaaacga tatttatcat aaaaaaaaaa a

```

SEQ 14: Tobacco NtGAD2

MVLSKTASESDVSVHSTFASRYVRTSLPRFKMPENSIPKEAAYQIINDELMLDGNPRLNLSFVTTWME  
 PECNTLMDSINKNYVDMDEYPVTTTELQNRVCNMIAHLFNAPLGDGETAVGVGTGVSSEAIMLAGLAFK  
 RKWQNKMKQAQKPFDPKPNIVTGANVQVCWEKFARYFEVELKEVKLSDGYVMDPEKAVEMVDENTICVA  
 AILGSTLNGEFEDVKRLNDLLIEKNKETGWDTPIHVDAASGGFIAPFLYPELEWDFRLPLEKSINVSGH  
 KYGLVYAGIGWAIWRNKEDLPDELIFHINYLGADQPTFTLNFSKGSSQVIAQYYQLIRLGFEGYKNVME  
 NCQENARVLRREGIEKSGRFNIIISKEIGVPLVAFSLKDNSQHNEFEISETLRRFGWIVLAYTMPNPAQH  
 TVLRVVIREDFSRTLAERLVIDIEKVFHGVDTLPARVNAKLAVAEANGSGVHKKTDREVQLEITTAWLK  
 FVADKKKKKTNGVC

SEQ 15: Petunia GAD

1 aaagagtaca aactaatatc cacttaaatt gtatttctcc attttctctc tttatttagt  
 61 ctgtcataac aatgggttcta tcaaagacag tgctgcagag cgatgtgtcc attcactcca  
 121 cgtttgcttc tcgatatgtt cgaacttctc ttcccagggt taaaatgcca gataattcga  
 181 taccaaaaga agcagcatat cagatcataa atgatgaact gatgttagat ggaaacccaa  
 241 ggctgaactt ggcttctttt gttacaacat ggatggaacc agagtgtgat aagttgatga  
 301 tggactctat taacaagaac tatgttgata tggatgaata tcctgttacc actgagcttc  
 361 agaatcgatg tgtaaacatg atagctcatt tgtttaatgc accacttgaa gatggagaaa  
 421 ctgcagttgg agttggaact gttggatcct ctgaagccat tatgcttgct ggattagctt  
 481 tcaagagaaa atggcagaac aaaatgaaag cccaaggcaa accctgtgac aagcccaaca  
 541 ttgttactgg tgcaaatgtc caggtgtgct gggagaaatt tgcaaggtat tttgaagtgg  
 601 agctaaagga agtaaagctt agtgaaggat actatgtgat ggaccctgag aaagctgtgg  
 661 agatgggtgga tgaaaacacc atttgtgtag ctgctatctt aggttccacc ctcaatggag  
 721 aatttgaaaga cgtaaagcgc ttgaatgatc tcttgggtcga gaagaacaaa gaaaccgggt  
 781 gggacactcc aattcatgtg gatgcagcaa gtggtggatt tattgcaccg ttcatttacc  
 841 cagagcttga gtgggacttt agattgccat tagtgaagag cattaatgta agtggtcaca  
 901 aataggtctc tgtctatgct ggtattggtt gggctcgttg gaggaacaag atgatttgc  
 961 ctgatgaact tatcttccac attaattatc ttggtgctga tcaacctact ttcactctca  
 1021 acttttctaa aggttctagc caagtaattg ctcaatatta ccaacttatt cgcttgggtt  
 1081 atgagggtta caagaatgtg atggagaatt gtcaagaaaa tgcacggtga ctaagagaag  
 1141 ggctagaaaa gacaggaaga ttcaacataa tctccaaaga aattggagta ctttagtag  
 1201 cattctctct taaagacaac aggcaacaca acgagttcga gatttctgaa actttaagga  
 1261 gatttggttg gattgttctt gcataacta tgccaccaa cgcacaacac attacagttc  
 1321 tcagagttgt gatcagagaa gatttctccc gtacgcttg agaacgactg gtaagagaca  
 1381 tcgaaaaagt cttcatgaa cttgacacac tccctgcacg tgtcaatgct aagctcgctg  
 1441 tggccgagga gcaggcggct gcgaatggca gcgaggtgca taagaaaaca gatagcgaag  
 1501 tgcagttgga gatgataact gcatggaaga agtttgttga agaaaagaag aagaagacta  
 1561 atcgagtttg ttaattaatt atattagtgt ttataatatg atgaatatgg ctattatcat  
 1621 tgggtactgc ttgttagtat attagctgtg attatcacca atatgagttt ggtttcttg  
 1681 atttggttct tttcagtact tgaaaagttg ttattgatat tgtaaaattg tactttttaa  
 1741 ctatttggat tattaatgcc aattttctag tgtacttaat aaaaa

SEQ 16: Petunia GAD

MVLSKTVSQSDVSIHSTFASRYVRTSLPRFKMPDINSIPKEAAYQIINDELMLDGNPRLNLSFVTTWME  
 PECDKLMDSINKNYVDMDEYPVTTTELQNRVCNMIAHLFNAPLEDGETAVGVGTGVSSEAIMLAGLAFK  
 RKWQNKMKQAQKPCDKPNIVTGANVQVCWEKFARYFEVELKEVKLSEGYVMDPEKAVEMVDENTICVA  
 AILGSTLNGEFEDVKRLNDLLVEKNKETGWDTPIHVDAASGGFIAPFIYPELEWDFRLPLVKSINVSGH  
 KYGLVYAGIGWVWRNKDDLDELIFHINYLGADQPTFTLNFSKGSSQVIAQYYQLIRLGYEGYKNVME  
 NCQENASVLRREGLEKTGRFNIISKEIGVPLVAFSLKDNQRHNEFEISETLRRFGWIVPAYTMPNPAQHI  
 TVLRVVIREDFSRTLAERLVRDIEKVLHELDLTPARVNAKLAVAEQAANGSEVHKKTDSEVQLEMIT  
 AWKKFVEEKKKKTNRVC

SEQ 17: Tomato GAD

10006852 "110701

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1      aaaaaatggt gttaacaacg acgtcgataa gagattcaga agagagcttg cactgtacat
61     ttgcatcaag atatgtacag gaacctttac ctaagttcaa aatgcctaaa aaatccatgc
121    cgaaaagaagc agcttatcag attgtaaacg acgagcttat gttggatggt aaccccaggt
181    tgaatttagc ttcctttgtt agcacatgga tggagcccga gtgcgataag ctcatcatgt
241    catccattaa taaaaactat gtcgacatgg atgagtatcc tgtcaccact gaacttcaaa
301    atagatgtgt taacatgtta gcacatcttt tccatgcccc gggttggtgat gatgagactg
361    cagttggagt tggtagatg gggttcatcag aggcaataat gcttgctggc cttgctttca
421    aacgcaaagt gcaatcgaaa agaaaagcag aaggcaaaccc ttctcgataag cctaatatag
481    tcaactggagc taatgtgcag gtctgctggg aaaaatttgc aaggatatttt gaggttgagt
541    tgaaggagggt gaaactaaaa gaaggatact atgtaatgga ccctgccaaa gcagtagaga
601    tagtggatga gaatacaata tgtgttgctg caatccttgg ttctactctg actggggagt
661    ttgaggatgt gaagctccta aacgagctcc ttacaaaaaaa gaacaaggaa accggatggg
721    agacaccgat tcatgtcgat gctgcgagtg gaggatttat tgctcctttc ctctggccag
781    atcttgaatg ggatttccgt ttgcctcttg tgaaaagtat aaatgtcagc ggtcacaagt
841    atggccttgt atatgctggt gtcggttggg tgatatggcg gagcaaggaa gacttgcccg
901    atgaactcgt ctttcatata aactaccttg ggtctgatca gcctactttt actctcaact
961    tctctaaagg ttcctatcaa ataattgcac agtattatca gttaataaga cttggctttg
1021   agggttataa gaacgtcatg aagaattgct tatcaaacgc aaaagtacta acagagggaa
1081   tcacaaaaat ggggcggttc gatattgtct ctaaggatgt ggggtgtcct gttgtagcat
1141   tttctctcag ggacagcagc aaatatacgg tatttgaagt atctgagcat ctcagaagat
1201   ttggatggat cgtccctgca tacacaatgc caccggatgc tgaacacatt gctgtactgc
1261   gggttgtcat tagagaggat ttcagccaca gcctagctga gagacttggt tctgacattg
1321   agaaaattct gtcagagttg gacacacagc ctctcgtttt gccaccacaaa gctgtccgtg
1381   tcaactgctga ggaagtgcgt gatgacaagg gtgatgggct tcatcatttt cacatggata
1441   ctgtagagac tcagaaaagac attatcaaac attggaggaa aatcgcaggg aagaagacca
1501   gcggagtctg ctaggtctgg ccacacttgt tatctgggct ccgcttccat cgccatcctg
1561   tagtatgtat tacgtgtgtt gtttccatct tatgtagtag ttggtagtgt aatctgtgta
1621   aatgctttca tgatcttggc tctgtatatg ctaaataagc actgcatttc aagttcctgg
1681   aagtatttat gtatgaatca atccgggcat aattggtaga atgccctctc tgcgtcatct
1741   ttgaatttca cgtgcaataa tatttgaaat ctacacctat tat

```

SEQ 18: Tomato GAD

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MVLTTTSIRDSEESLHCTFASRYVQEPLPKFKMPKKSMPKEAAYQIVNDELMLDGNPRLNLASFVSTWM
EPECDKLIMSSINKNYVDMDEYPVTTTELQNRVCNMLAHLFHAPVGDDETA VGVTGVSSEAIMLAGLAF
KRKWKQSKRKAEGKPFDPKPNIVTGANVQVCWEKFARYFEVELKEVKLKEGYVMDPAKAVEIVDENTICV
AAILGSTLTGEFEDVKLLNELLTKKNKETGWETPIHVDASGGFIAPFLWPDLEWDFRLPLVKSINVSG
HKYGLVYAGVGWVIWRSKEDLPDELVFHINYLGSQPTFTLNFSGSYQIIAQYYQLIRLGFEGYKNVM
KNCLSLNAKVLTEGITKMRGRFDIVSKDVGVPVAFSLRDSISKYTVFEVSEHLRRFGWIVPAYTMPDPAEH
IAVLRVVIREFSHSLAERLVSDIEKILSELDTQPPRLPTKAVRVTAEEVRDDKGDGLHHFHMDTVETQ
KDIKHWKRIAGKKTSGVC

```

1) *Arabidopsis thaliana* ecotype Columbia glutamate decarboxylase 1 (GAD1) cDNA

Note: This is nucleic acid SEQ #1 and amino acid SEQ #2

A) LOCUS ATU10034  
 ACCESSION U10034  
 VERSION U10034.1 GI:497978  
 REFERENCE

AUTHORS Arazi,T., Baum,G., Snedden,W.A., Shelp,B.J. and Fromm,H.  
 TITLE Molecular and biochemical analysis of calmodulin interactions with  
 the calmodulin-binding domain of plant glutamate decarboxylase  
 JOURNAL Plant Physiol. 108 (2), 551-561 (1995)

1. From Arabidopsis genome sequencing project chromosome 5 (ACC#  
 AB005238)  
 LOCUS BAB10520  
 DEFINITION glutamate decarboxylase 1 (GAD 1) (*Arabidopsis thaliana*)  
 ACCESSION BAB10520  
 PID g10177078  
 VERSION BAB10520.1 GI:10177078  
 REFERENCE 1 (sites)  
 AUTHORS Sato,S., Kotani,H., Nakamura,Y., Kaneko,T., Asamizu,E.,  
 Fukami,M., Miyajima,N. and Tabata,S.  
 TITLE Structural analysis of Arabidopsis thaliana chromosome 5. I.  
 Sequence features of the 1.6 Mb regions covered by twenty physically  
 assigned P1 clones  
 JOURNAL DNA Res. 4 (3), 215-230 (1997)

2) *Arabidopsis thaliana* ecotype Columbia glutamate decarboxylase 2 (GAD2) cDNA

Note: This is nucleic acid SEQ #3 and amino acid SEQ #4

- A) LOCUS ATU46665  
 ACCESSION U46665  
 VERSION U46665.1 GI:1184959  
 REFERENCE  
 AUTHORS Turano,F.J. and Fang,T.K.  
 TITLE Characterization of two glutamate decarboxylase cDNA clones from  
 Arabidopsis  
 JOURNAL Plant Physiol. 117 (4), 1411-1421 (1998)
- B) LOCUS ATU49937  
 ACCESSION U49937  
 VERSION U49937.1 GI:1236618  
 REFERENCE  
 AUTHORS Zik,M., Arazi,T., Snedden,W.A. and Fromm,H.  
 TITLE Two isoforms of glutamate decarboxylase in Arabidopsis a  
 regulated by calcium/calmodulin and differ in organ distribution  
 JOURNAL Plant Mol. Biol. 37 (6), 967-975 (1998)
- C) From Arabidopsis genome sequencing project  
 ACCESSION #AC009513  
 Part of chromosome # 1  
 note="Identical to gblU46665 glutamate decarboxylase 2 (GAD 2)  
*Arabidopsis thaliana*. and ESTs gblW43856, gblN37724,  
 gblZ34642 and gblR90491 come from this gene."  
 /protein\_id="AAF06056.1"  
 /db\_xref="GI:6227020"

10006852.110701



3) *Arabidopsis thaliana* ecotype Columbia putative glutamate decarboxylase (putative GAD3) DNA From Arabidopsis genome sequencing project

Note: This is nucleic acid SEQ #5 and amino acid SEQ #6

ACCESSION #AC006532

Part of chromosome #2

/product="putative glutamate decarboxylase"

/protein\_id="AAD20093.1"

/db\_xref="GI:4406783"

4) *Arabidopsis thaliana* ecotype Columbia putative glutamate decarboxylase (putative GAD4) DNA From Arabidopsis genome sequencing project

Note: This is nucleic acid SEQ #7 and amino acid SEQ #8

ACCESSION #AC006532

Part of chromosome #2

/product="putative glutamate decarboxylase"

/protein\_id="AAD20099.1"

/db\_xref="GI:4406789"

5) *Arabidopsis thaliana* ecotype Columbia putative glutamate decarboxylase (putative GAD5) DNA From Arabidopsis genome sequencing project

Note: This is nucleic acid SEQ #9 and amino acid SEQ #10

ACCESSION #AB026646

Part of chromosome #3

/evidence=not\_experimental

/product="glutamate decarboxylase"

/protein\_id="BAB02870.1"

/db\_xref="GI:9294589"

6) Tobacco (*Nicotiana tabacum*) glutamate decarboxylase isozyme 1 (NtGAD1) cDNA

Note: This is nucleic acid SEQ #11 and amino acid SEQ #12

A) LOCUS AF020425

ACCESSION AF020425

VERSION AF020425.1 GI:3252855

REFERENCE

AUTHORS Yun,S.J. and Oh,S.H.

TITLE Cloning and characterization of a tobacco cDNA encoding calcium/calmodulin-dependent glutamate decarboxylase

JOURNAL Mol. Cells 8 (2), 125-129 (1998)

B) LOCUS NTU54774  
 ACCESSION U54774  
 VERSION U54774.1 GI:1777920  
 REFERENCE  
 AUTHORS Dharmasiri,M.A.N., Lu,Y.T. and Harrington,H.M.  
 TITLE Cloning and sequencing of a tobacco cDNA encoding glutamate  
 decarboxylase  
 JOURNAL Unpublished

7) Tobacco (*Nicotiana tabacum*) glutamate decarboxylase isozyme 2 (NtGAD2)  
 cDNA

Note: This is nucleic acid SEQ #13 and amino acid SEQ #14

LOCUS AF020424  
 ACCESSION AF020424  
 VERSION AF020424.1 GI:3252853  
 REFERENCE 1 (bases 1 to 1771)  
 AUTHORS Yun,S.J. and Oh,S.H.  
 TITLE Cloning and characterization of a tobacco cDNA encoding  
 calcium/calmodulin-dependent glutamate decarboxylase  
 JOURNAL Mol. Cells 8 (2), 125-129 (1998)

8) Petunia (*Petunia hybrida*) glutamate decarboxylase cDNA

Note: This is nucleic acid SEQ #15 and amino acid SEQ #16

2. LOCUS PETGADX  
 ACCESSION # L16797  
 VERSION # L16797.1 GI:294111  
 KEYWORDS glutamate decarboxylase.  
 REFERENCE  
 AUTHORS Baum,G., Chen,Y., Arazi,T., Takatsuji,H. and Fromm,H.  
 TITLE A plant glutamate decarboxylase containing a calmodulin binding  
 domain: cloning, sequence, and functional analysis  
 JOURNAL J. Biol. Chem. 268, 19610-19617 (1993)

B) LOCUS PETGLUDECA  
 ACCESSION L16977  
 VERSION L16977.1 GI:309679  
 REFERENCE  
 AUTHORS Baum,G., Chen,Y., Arazi,T., Takatsuji,H. and Fromm,H.  
 TITLE A plant glutamate decarboxylase containing a calmodulin-binding  
 domain: cloning sequence and functional analysis  
 JOURNAL J. Biol. Chem. (1993)

9) Tomato (*Lycopersicon esculentum*) glutamate decarboxylase-like protein LEGDL  
 cDNA

10006552 110701

Note: This is nucleic acid SEQ #17 and amino acid SEQ #18

ACCESSION X80840

VERSION X80840.1 GI:993002

REFERENCE

AUTHORS Gallego,P.P., Whotton,L., Picton,S., Grierson,D. and Gray,J.E.

TITLE A role for glutamate decarboxylase during tomato ripening: the  
characterization of a cDNA encoding a putative glutamate decarboxylase with a  
calmodulin-binding site

JOURNAL Plant Mol. Biol. 27 (6), 1143-1151 (1995)

10006852.110701